



Power Utility Level of Service



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PRESENTATION AGENDA

- ⌚ Measuring Level of Service
- ⌚ 2016 How did we do?
- ⌚ How we compare
- ⌚ Worst Sections of Town
- ⌚ Over the Years
- ⌚ Reasons for Outages
- ⌚ Overhead vs Underground
- ⌚ Getting on top of Maintenance
- ⌚ Keeping up with Reliability
- ⌚ In Summary



MEASURING LEVEL OF SERVICE

- ⌚ **System Average Interruption Duration Index (SAIDI)**
 - ⌚ The average total outage duration per customer, per year
- ⌚ **System Average Interruption Frequency Index (SAIFI)**
 - ⌚ The average number of interruptions per customer, per year
- ⌚ **Customer Average Interruption Duration Index (CAIDI)**
 - ⌚ The average total outage duration per customer, per interruption
- ⌚ **Average Service Availability Index (ASAI)**
 - ⌚ The percentage of time customers have electricity, system wide

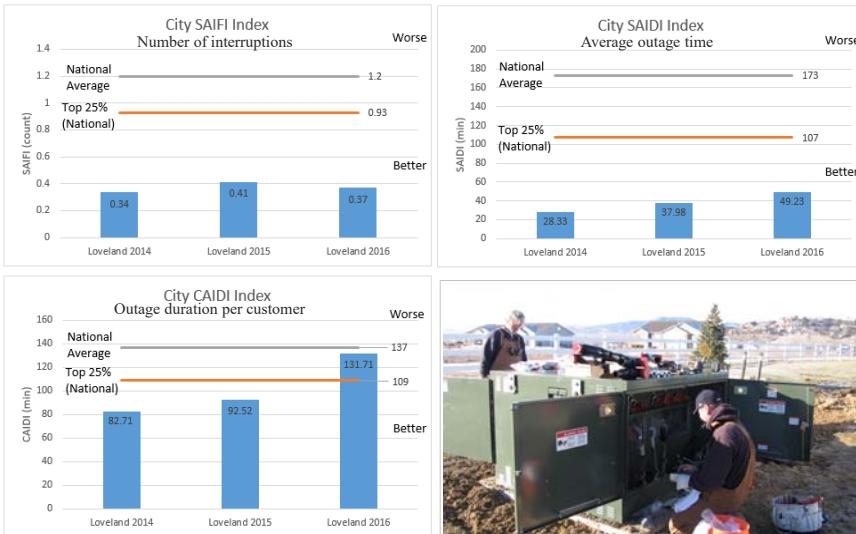


2016 HOW DID WE DO?

- ⌚ **Customers Served:** 35,934
- ⌚ **1 Major Event Day:** March 23, 2016
- ⌚ **In General:**
 - ⌚ **SAIDI:** 49 minutes of average outage time per customer
 - ⌚ **SAIFI:** Customers experienced 0.4 interruptions
 - ⌚ **CAIDI:** 2 hours 10 minutes of outage duration per customer during an interruption
 - ⌚ **ASAI:** The overall system availability was 99.9907%



HOW WE COMPARE



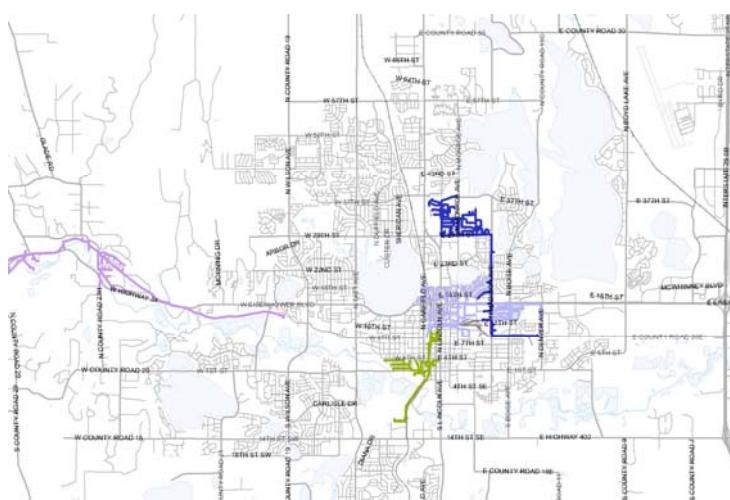
City of Loveland:

- Ranks in the top 25% of reporting utilities
- Is nearing national average on length of outages

* National comparisons presented are from reporting utilities in 2015



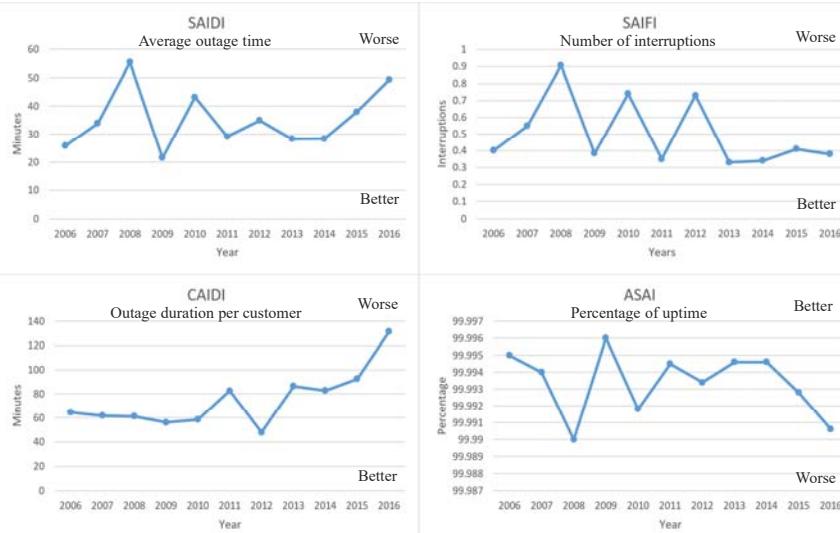
WORST SECTIONS OF TOWN



Circuit ID	SAIFI (Interruptions)	SAIDI (minutes)	CAIDI (minutes)	ASAI (%)
911	4.4	515	116	99.90
224	3.4	257	76	99.95
231	1.0	93	93	99.98
421	0.9	39	45	99.99



OVER THE YEARS

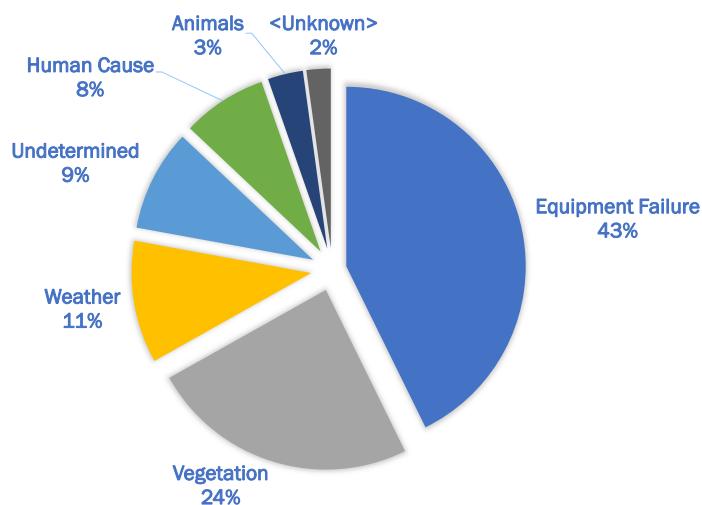


In General:

- Outages per customer is stable
- Customers are experiencing longer outages
- Overall system reliability is decreasing



REASONS FOR OUTAGES



OVERHEAD VS. UNDERGROUND

The City of Loveland is 83% underground

UNDERGROUND

- Less frequent interruptions
- Longer duration of interruptions
- Outages are generally related to equipment
- Shorter lifespan of equipment



OVERHEAD

- More frequent interruptions
- Easier to find, shorter duration
- More susceptible to human caused outages, animal contact and weather
- Longer lifespan



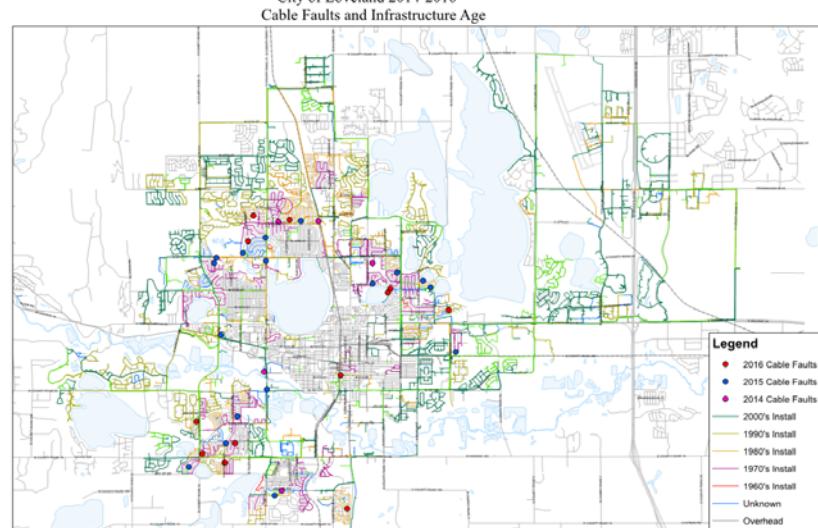
GETTING ON TOP OF MAINTENANCE

Need for Cable Replacement Priorities and Plans

- ⌚ Aging infrastructure areas
- ⌚ High failure areas
- ⌚ Having the data is not good enough, we need to analyze the data and keep it a priority

Financial constraints

- ⌚ Competing Priorities
- ⌚ Development driven projects take priority
- ⌚ Maintenance becomes a lower priority



KEEPING RELIABILITY UP

Asset management and regular inspections

- ⌚ We perform inspections on vital equipment periodically
- ⌚ We need to use inspection data to identify possible problems

System maintenance

- ⌚ We track system issues
- ⌚ We need to use data to pinpoint system maintenance and replacement
- ⌚ We need to keep system maintenance a priority, despite current struggles to meet new demand
- ⌚ New in 2017: We have started a maintenance crew to focus on these issues working closely with operations and engineering



Fuse loading investigations

- ⌚ Is our system able to meet peak demand in its current state



IN SUMMARY

City of Loveland reliability is trending downwards, but...

- ⌚ We are still in the top tiers of the nation
- ⌚ We are working on staying in the top tiers of the nation

Next steps for maintenance

- ⌚ Continue working with maintenance crew
- ⌚ Leveraging system data for effective use of funds
- ⌚ Continuing to track system assets while developing a more sound asset management system
- ⌚ Ensure system maintenance continues to be a priority





QUESTIONS?